E X P L O R A T I O N T E C H N I C A L M E M O R A N D U M

Utah Coal Regulatory Program

March 17, 2004

TO: Internal File

THRU: Peter H. Hess, Environmental Scientist III/Inspector, Team Lead

FROM: Priscilla W. Burton, Environmental Scientist III/Soils.

RE: Coal Exploration for Seam Thickness and Quality, Canyon Fuel Company, LLC, Dugout Canyon Mine, C/007/039, Task ID #1834

SUMMARY:

On February 9, 2004, Ark Land Company (a subsidiary of Arch Coal Inc.) submitted a notice of Intent to Conduct Minor Coal Exploration within the 2,560-acre SITLA Dugout Coal Tract (T 13 S, R 13 E). The exploration area is located 15 miles northeast of Wellington in the Book Cliffs at elevations between 7,200 and 8,700 ft (Maps 1 & 2).

The drilling program is planned for eight weeks in July through September of 2004 (hole DUG0103) and July- September 2005 (hole DUG0105 and hole DUG0205). Approximately 300 lbs of coal will be removed per hole, which places this activity in the Minor Coal Exploration category of the R645-201-200 rules. Reclamation in accordance with the requirements of R645-202 is required.

At each hole, approximately 0.25 acres will be disturbed for the drilling activity. Access roads to each site will be widened and graveled, creating additional disturbance acreage that was not disclosed. Topsoil depth was not described; although the application indicates that the "A" horizon will be salvaged and if needed, separate storage of material below the "A" horizon to create a level drill site. Each site will have two mud pits excavated for disposal of cuttings, drilling foam and/or mud, "if there is sufficient soil depth."

In the absence of any site-specific information, the Division has determined from review of the 1988 Carbon County Soil Survey that the depth of topsoil removal should be approximately one foot of topsoil/subsoil at each of the three drill hole locations. The Division also has noted the potential for shallow depth to bedrock at all three locations and requests that the Applicant develop an alternative to the two mud pits/site described for the drill pads or

conduct a reconnaissance inspection of the drill sites to confirm placement, depth and breadth of the mud pits.

Reclamation of the site must include ripping the disturbed site and gouging the final soil surface.

EXPLORATION TECHNICAL ANALYSIS:

COAL EXPLORATION

Regulatory Reference: R645-200.

REQUIREMENTS FOR NOTICE OF INTENTION TO CONDUCT MINOR COAL EXPLORATION

Regulatory Reference: 30 CFR 772.10; 30 CFR 772.11; R645-100-412; R645-201-200.

Analysis:

The drilling procedure will be continuous core or rotary drilling and spot coring. Water will be carried by pipeline and truck from sources 0.5 to two miles away.

Topsoil depth was not described; although the application indicates that the "A" horizon will be salvaged and if needed, separate storage of material below the "A" horizon to create a level drill site. Each site will have two mud pits excavated for disposal of cuttings, drilling foam and/or mud, "if there is sufficient soil depth."

The Division reviewed the 1988 Carbon County Soil Survey to find general descriptions of the soils in the locations of the proposed drill holes. Information from the 1988 Order III Soil Survey is summarized below.

DUG0104 is in Map Unit 97, the Rottulee family-Trag complex. Sixty percent of this map unit is the Rottulee family loam having 30 – 60% slopes; described as having a two-inch deep surface layer that is reddish brown in color. The subsoil is divided into a thirteen-inch reddish brown loam and clay loam and a lower eight-inch layer of reddish brown gravelly silty clay loam. **Shale is encountered at 34 inches.**

Twenty percent of Map unit 97 is in the Trag stony loam having 30 – 60% slopes. The surface layer is a ten-inch thick dark grayish brown stony loam. The 26 inches of subsoil

is dark grayish brown clay loam. The substratum is dark grayish brown and very pale brown clay loam **extending to 60 inches or more.**

Since the Trag and Rottulee soils vary greatly in topsoil depth and depth to bedrock, and since there is a possibility that the DUG0104 lies in the 20% of the Map Unit described as "other soils", there must be a reconnaissance inspection of drill hole DUG0104 prior to soil salvage to determine the depth of the topsoil layer to be salvaged and the potential for mud pit excavation. Or, alternatively, the Applicant could commit to the salvage of one foot of topsoil/subsoil from DUG0104 (or about 400 CY/0.25 ac) and eliminating a mud pit at DUG0104.

DUG0105 is in Map Unit 62, Midfork Family-Commodore Complex. Fifty percent of this unit is described as Midfork family bouldery loam having 50 to 70 percent slopes. The surface of the Midfork family soil is covered with a partially decomposed organic layer about 2 inches thick. The topsoil is brown bouldery loam about 7 inches thick. Below this is a layer of yellowish brown very channery loam, 10 inches thick. And below this to a depth of **60 inches or more** is yellowish brown very gravelly loam.

Twenty percent of this Map unit is described as Commodore bouldery loam, 50 – 70% slopes. The Commodore soil has an organic layer about 1 inch thick and a surface layer of brown bouldery loam about 6 inches thick. The underlying material (to a depth of 19 inches) is brown very stony loam. **Bedrock is between 10 and 20 inches.**

Since the Midfork family and Commodore bouldery loam soils have nine and seven inches of topsoil depth, respectively, and since there is a possibility that the DUG0105 lies in the 30% of the Map Unit described as "other soils", there must be a reconnaissance inspection of drill hole DUG0105 prior to soil salvage to determine the depth of the topsoil layer and depth to bedrock. Or, alternatively, the Applicant could commit to the salvage of one foot of topsoil/subsoil from DUG0105 (or about 400 CY/0.25 ac) and eliminating a mud pit at DUG0105.

DUG0205 is in Map Unit 100, Senchert loam, having 3 – 15% slopes. This unit is on plateaus and ridges. The Senchert loam surface layer is very dark grayish brown loam about 4 inches thick. The subsoil is brown loam (twelve inch depth) over brown clay loam (13 inches). **Calcareous sandstone is found between 20 and 40 inches.** The Applicant must salvage four inches of topsoil and eight inches of subsoil from this drill location (400 CY/0.25ac). A mud pit will not be possible at DUG0205 where depth to bedrock is between 20 and 40 inches.

Findings:

The information provided does not adequately describe protection the topsoil resource from adverse impacts associated with drilling activity. The Applicant should provide the following, prior to approval, in accordance with:

R645-202-233 and R645-201-225, (1) Since the Trag and Rottulee soils vary greatly in topsoil depth, and since there is a possibility that the DUG0104 lies in the 20% of the Map Unit described as "other soils", there must be a reconnaissance inspection of drill hole DUG0104 prior to soil salvage to determine the depth of the topsoil layer to be salvaged. Or, the Applicant could commit to salvage of one foot of topsoil/subsoil from DUG0104 (about 400 CY/0.25 ac) and provide for some alternative to a mud pit for collecting drilling waste. **(2)** The Applicant must salvage four inches of topsoil and eight inches of subsoil from DUG0205 (400 CY/0.25 ac). **(3)** Since the Midfork family and Commodore bouldery loam soils have nine and seven inches of topsoil depth, respectively, and since there is a possibility that the DUG0105 lies in the 30% of the Map Unit described as "other soils", there must be a reconnaissance inspection of drill hole DUG0105 prior to soil salvage to determine the depth of the topsoil layer and depth to bedrock. Or, the Applicant could commit to salvage of one foot of topsoil/subsoil from DUG0105 (or about 400 CY/0.25 ac) and provide for some alternative to a mud pit for collecting drilling waste. **(4)** At DUG0205, where depth to bedrock is between 20 and 40 inches, the Applicant must either provide the results of a reconnaissance inspection determining that a mud pit development is possible and describe the depth and width of the mud pit or provide for some alternative to a mud pit for collecting drilling waste.

RECLAMATION STANDARDS

Regulatory Reference: 30 CFR 772.13; R645-202-200.

Analysis:

Revegetation

Widening of the access road and subsequent reclamation were not addressed in the application.

The plan should describe a method for breaking up the soils of the disturbed area prior to replacement of topsoil (such as ripping). To encourage prompt reclamation, through water harvesting and wind protection, the final soil surface must be gouged.

Boreholes

The drilling procedure will be continuous core or rotary drilling and spot coring. The holes will be sealed with cement, cement/bentonite slurry or bentonite chips. All bentonite and cement spilled during the sealing process must be buried and mixed into the subsoil below two feet or hauled off-site.

Findings:

The information provided does not indicate that the land will be revegetated in a manner that encourages prompt revegetation. Prior to approval, the Applicant must provide the following, in accordance with:

R645-202-242 and R645-201-225, (1) The Application should indicate that the soils of the disturbed area will be ripped or otherwise treated for compaction, prior to replacement of topsoil. **(2)** To encourage prompt reclamation, through water harvesting and wind protection, the final soil surface must be gouged. **(3)** All bentonite and cement spilled during the sealing process must be hauled off-site or buried and mixed into the subsoil at a depth below two feet. **(4)** Widening of the access roads and subsequent reclamation must be addressed in the application.

RECOMMENDATIONS:

The property falls under the Surface Land Owner Agreement dated November 22, 1999, and First Amendment to Surface Use Agreement dated August 13, 2001 between Canyon Fuel Company (CFC) and Thayn. As required by these agreements, CFC must contact Thayn in writing of the proposed disturbance (Section 412.200). It is recommended that the DOGM Inspector verify that these letters have been sent.

Further information is requested in the application prior to its approval.